

Date: Friday, 3/9/2007 10:19:23 AM
User: Kim Johnston

Process Sheet

Customer	: CU-DAR001 Dart Helicopters Services	Drawing Name	: X-TUBE 412
Job Number	: 31152		
Estimate Number	: 12783		
P.O. Number	: <i>N/A</i>	Part Number	: D412664145
This Issue	: 3/9/2007	Drawing Number	: D412-664-245 U/R
Prsht Rev.	: NC	Project Number	: N/A
First Issue	: <i>N/A</i>	Drawing Revision	: U/R
Previous Run	: 31139	Material	: <i>N/A</i>
Written By	: <i>[Signature]</i>	Due Date	: 4/6/2007
Checked & Approved By	: <i>[Signature]</i>	Qty:	1 Um: Each
Comment	: Est Rev: A New Issue 07-02-14 JLM		



AL 07.03.09

Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :
---------	-----------------------	---------------

1.0	DC	DOCUMENT CONTROL
-----	----	------------------



Comment: Photocopy bluefile & type labels per PPPD412-664-105 CHG 001

N/A

2.0	D6019128	Crosstube Material
-----	----------	--------------------



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Pick:

Qty Part number Description Batch

1 D6019-128 Crosstube *29369*

Check OD = 2.7500"; ID =

BC 07.03.12 (1)

3.0	MORI SEIKI	MORI SEIKI CNC LATHE LARGE
-----	------------	----------------------------



Comment: MORI SEIKI CNC LATHE LARGE

Turn as per Dwg D412-664-145

BC 07.03.12 (1)

4.0	QC2	INSPECT PARTS AS THEY COME OFF MACHINE
-----	-----	--



Comment: INSPECT PARTS AS THEY COME OFF MACHINE

BC 07.03.12 (1)

5.0	QC8	SECOND CHECK
-----	-----	--------------



Comment: SECOND CHECK

SA 07.03.12

6.0	LANDING GEAR 1	LANDING GEAR RESOURCE 1
-----	----------------	-------------------------



Comment: LANDING GEAR RESOURCE 1

1-Polish entire outside surface of crosstube

DP 7-3-13

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Friday, 3/9/2007 10:19:23 AM
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Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31152

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description :

7.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP.

BE 07-03-13

8.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

JD 7-3-13

9.0

QC3/5

INSPECT WORK/WING WALK



QC3
Pmc 07-04-04 (1)



Comment: Inspect work & Chemical conversion Coat

BE 07-04-04 QC5 (1)

10.0

BENDING

BENDING MACHINE



Comment: BENDING MACHINE

Bend tube as per Dwg D412-664-145 using CNC bender program

EL 7-4-4

11.0

QC5
Q15

DIMENSIONAL CHECK



207-04-12



(P10)

Comment: DIMENSIONAL CHECK

12.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Drill pilot holes in tube as per Dwg D412-664-245

2-Ream hole to finish size in tube as per Dwg D412-664-245

3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-245

} BE
07-04-24

JD 7-4-24

13.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat Tube as per QSI 005 4.1

JD 7-4-24

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
07-04-12	11-6	QCIS required. perm. change <i>2</i>				<i>2</i> 07-04-12	<i>2</i> 07-04-12

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Friday, 3/9/2007 10:19:24 AM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31152

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description:

14.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

0704-25

15.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

0704-25

16.0

OUTSIDE SERVICE

OUTSIDE SERVICES



Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 038Or
Issue P/O: 3644 LPI as per ASTM 1417
Level 2 Attach copy of NDT results to work order

0704/26 ①

17.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage
Ensure copy of NDT results attached to work order.

0704/05/01

18.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: Inspect for damage & ensure results are as per Dwg D412-664-203

0705-01 ①

POSITIVE
RECALL
①

19.0

SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside and outside crosstube as per QSI 005 4.2

2-Paint outside crosstube with White Imron as per QSI 005 4.2

0705-02

20.0

QC14

Inspect Spray Paint



Comment: Inspect Spray Paint

Wrap in plastic bag to protect from scratches

0705-03 ①

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
070502	18.0	Tube accepted as a pass. No NDT results were received from Hemth A.V. Continue : do not pass step 28.0. REC'D 0705.02 11:30		070502	1		

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
	1							

NOTE: Date & initial all entries

Date: Friday, 3/9/2007 10:19:24 AM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31152

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description :

21.0

D31893

Chafing Shield



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Chafing Shield

Batch:

~~31856~~ ~~31856~~ 31959

RT 07-05-04

22.0

D3595

Rubber Cushion (per sq ft)



Comment: Qty.: 0.0798 sf(s)/Unit Total : 0.0798 sf(s)

Rubber Cushion

Cut to .630" X 4.4" X 4 PCS

Batch:

31948

RT 07-05-04

23.0

D28931

Support



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part number Description Batch

2 D2893-1

Support

27475

RT 07-05-04

24.0

D2856600

Abrasion Strip



Comment: Qty.: 0.9450 f(s)/Unit Total : 0.9450 f(s)

Abrasion Strip

1X D2856 .250" X 8.42"

Batch:

26690

RT 07-05-04

25.0

MS2192024

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part number Description Batch

2 MS21920-24

Clamp

103002

RT 07-05-04

26.0

MS2192024

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

clamp(per MIL-DTL-8783C)

batch:

M103002

RT 07-05-04

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes ☐ No ☒ DQA: ☒ Date: 07/05/04
 QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Friday, 3/9/2007 10:19:24 AM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31152

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description :

27.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1
Assemble as per Dwg D412-664-145

Install Chaffing Sheild

Instal supports with magnobond 6398 per dwg D412-664-245,
cure for 12hrs before packaging.

Time & date of application:

1200 07-05-03

Batch:

m103 628

RT 07-05-03

28.0

QC5

INSPECT WORK TO CURRENT STEP



POSITIVE
RECALL

Comment: INSPECT WORK TO CURRENT STEP

07-05-03

29.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and pack for shipping as per PPP D412-664-105

*****Ensure tube is not packaged if curing time is less than 12 hrs, see step 26 for application time & date

Time & date of packaging:

07-05-04 11:30
32105 SD

POSITIVE RECALL

EFFECTIVE

07-05-04 AUTH UP

Location:

RELEASED

DATE 07-05-04

PPP Rev:

PPP 32107 7/5/4

30.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

07/05/04

Job Completion



07-05-04

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



DESIGN <i>qp</i>	DRAWN BY <i>qp</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>#</i>	APPROVED <i>#</i>	DRAWING NO. D412-664-145	REV. B SHEET 1 OF 3
DATE 07.03.01		TITLE CROSSTUBE ASS'Y (412 LOW-N FWD) NTS	
A	06.12.21	NEW ISSUE	
B	07.03.01	CHG RUBBER CUSHION	

PRELIMINARY ISSUE

PARTS LIST:

Qty	Part Number	Description
X	D412-664-145	CROSSTUBE ASSEMBLY (412 LOW-NARROW FWD)
1	D6019-128	CROSSTUBE
1	D2856-250-842	ABRASION STRIP
2	D2893-1	SUPPORT
1	D3189-3	CHAFING SHIELD
4	D3595-063-440	RUBBER CUSHION
2	MS21920-22	CLAMP
4	MS21920-24	CLAMP
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

GENERAL NOTES:

- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 2) MATERIAL: MANUFACTURED FROM D6019-128
FINISHED LENGTH = 124.48±0.020 (BEFORE BENDING/TRIMMING)
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR MS21920-22 CLAMPS AND ASSOCIATED HARDWARE.
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-XXX-YYY ABRASION STRIPS WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-24 CLAMPS WITH D3595-063-440 RUBBER CUSHIONS TO SECURE CROSSTUBE SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB.

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D2893-1
CROSSTUBE
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WORK ORDER
NO. 31152

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DART AEROSPACE LTD	Work Order: 31152
Description: X-TUBE	Part Number: D412-664-145
Inspection Dwg: D412-664-145 Rev: B	Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☒ Prototype

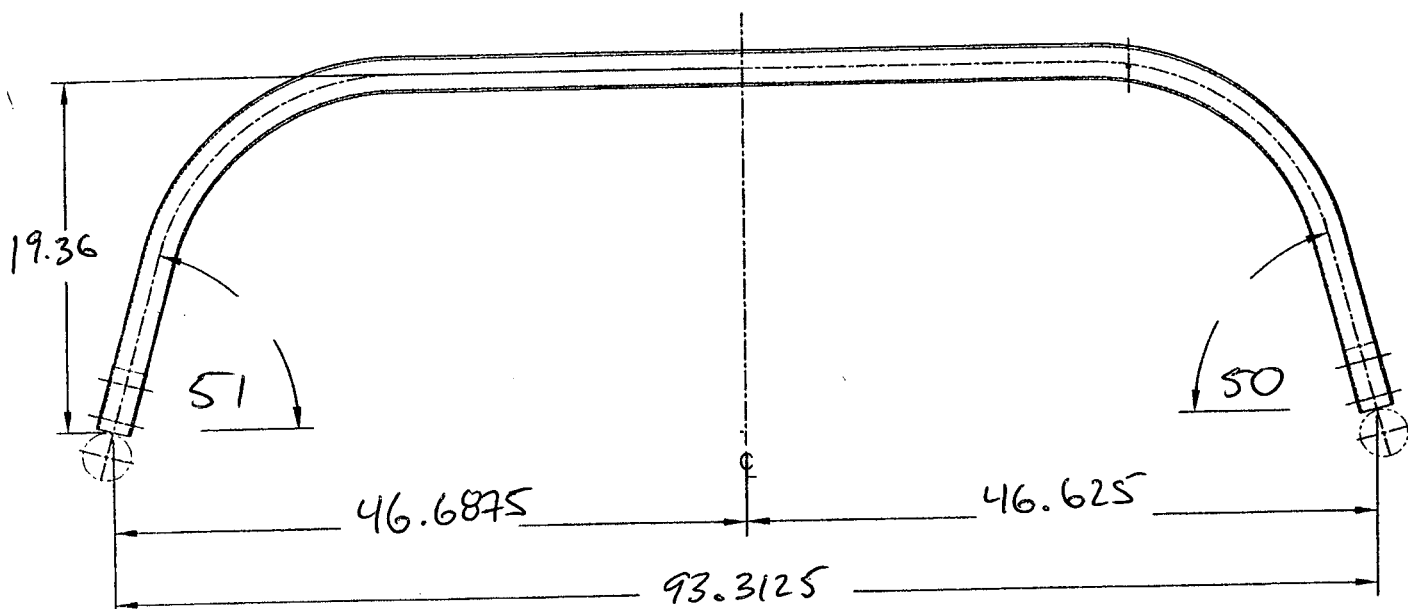
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Measured by: <u>SG</u>	Audited by: <u>SD</u>	Prototype Approval:
Date: <u>07-03-12</u>	Date: <u>07-03-12</u>	Date:

Rev	Date	Change	Revised by	Approved
A		New Issue	KJ/JLM	

DART AEROSPACE LTD		Work Order:	31152
Description: Crosstube Low Narrow Aft (412)		Part Number:	D412-664-245
Inspection Dwg: D412-664-245 Rev: B		Page 1 of 1	

Required Dimension	Min	Max
Height	19.33	19.49
1/2 Span	46.47	46.73
Angle	49	52
Total Span	92.94	93.46



Comments

QC15 Inspection	<i>[Signature]</i>
Date	07.04.12

Rev	Date	Change	Revised by	Approved
A	07.03.29	New Issue	KJ/JM	

**HeathAir**

INTERNATIONAL (1991) INC.

681 Ave. Lepine, Dorval, Québec H9P 1G3
Tél.: (514) 636-1000 • Fax: (514) 636-0031

W.O. N° 36257

A.M.O. Number: 46/90

NON-DESTRUCTIVE TESTING REPORT**AIRCRAFT / COMPONENT INFORMATION**

REGISTRATION: -

MODEL/TYPE: -

SERIAL NUMBER: -

TOTAL HR/LDG: -

OPERATED BY: -

BASED AT: -

INSPECTION REQUIREMENTS

Carry out FPI of (13) cross tubes (external surface) as per ASTM E-1417-05 and the Dart QSI 038, Section 4.1.1 (on file at client) - parts delivered to HeathAir.

Qty (1) P/N D058-676-101 S/N B30250.

Qty(2) P/N D206-667-103 S/N's B30429 and B28979.

Qty (1) P/N D206-667-203 S/N B29635.

Qty(1) P/N D206-667-201 S/N B29098.

Qty (2) P/N D412-664-245 S/N's B31600 and B31598.

Qty (2) P/N D412-664-145 S/N's B31434 and B31152.

Qty (4) P/N D206-667-101 S/N's B30438, B28680, B29101 and B29099.

☐ RADIOGRAPHY☐ ULTRASONIC☒ PENETRANT☐ MAGNETIC PARTICLE☐ EDDY CURRENT**INSPECTION REPORT**

Fluorescent penetrant inspection was performed in accordance with the above requirements on (13) cross tubes.

Note: A Level 3 penetrant was substituted for the requested Level 2 (3 is more sensitive)
Ardrox 970P25E Batch #04B503.

(13) cross tubes inspected. (10) PASSED / (3) FAILED.

Note: Failed items were serial numbers from above - B30250, B28680 and B29101.
- tubes were marked in areas requiring rework.THE MAINTENANCE DESCRIBED ABOVE HAS BEEN PERFORMED IN ACCORDANCE WITH
THE APPLICABLE STANDARDS OF AIRWORTHINESSINSPECTED BY: 

DATE

April 27, 2007.

INSPECTION
STAMP(S)**CUSTOMER INFORMATION**

CUSTOMER: Dart Aerospace

P.O. NUMBER PO 00003644

ADDRESS: fax to 613-632-1053

CONTACT NAME: Linda Lacelle

LABOUR

②

\$

MATERIALS

②

TRAVEL EXPENSES

②

GST

HOTEL EXPENSES

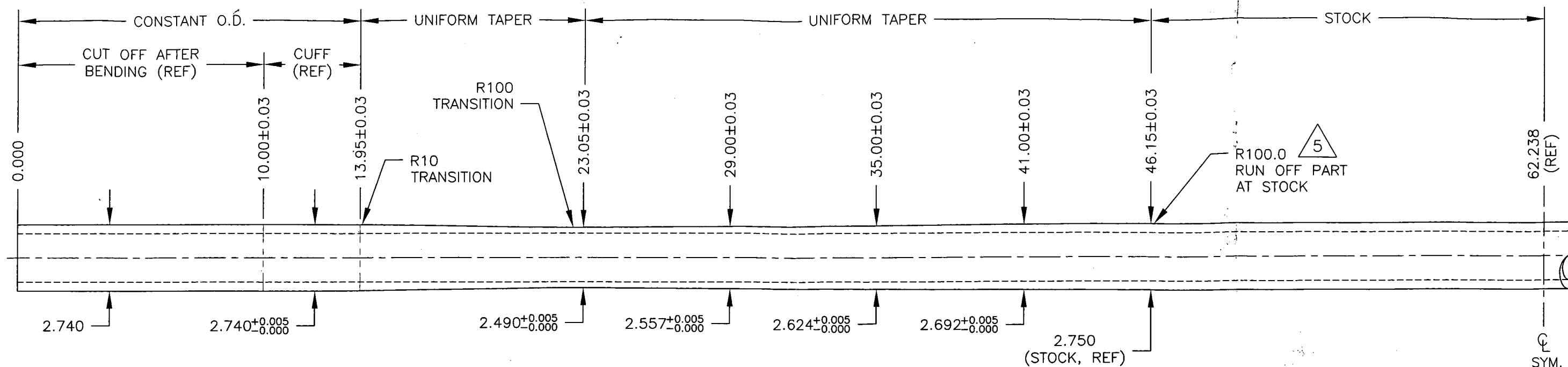
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PST

INVOICE NO.

TOTAL \$

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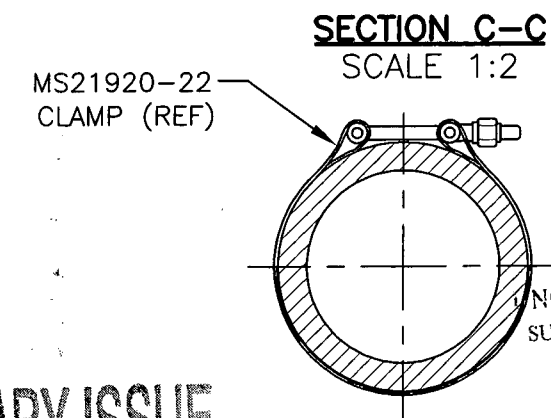
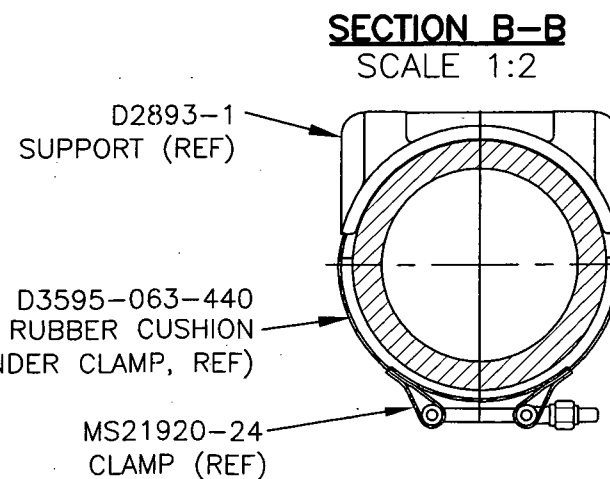
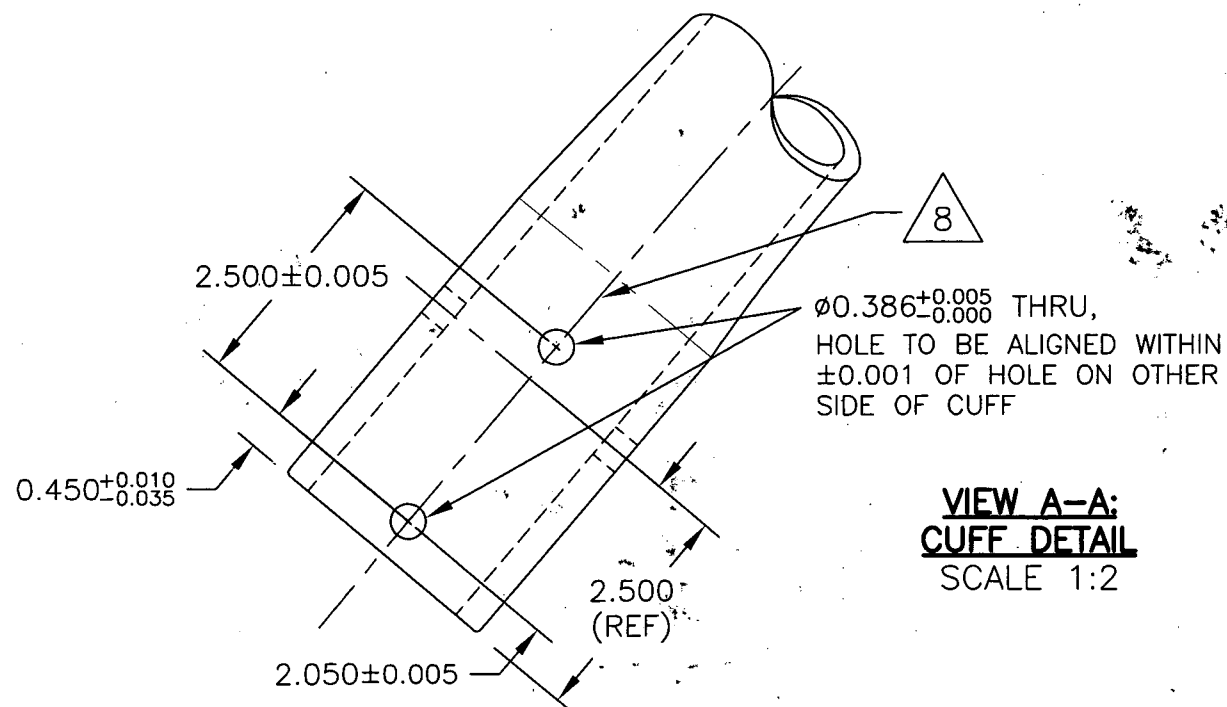
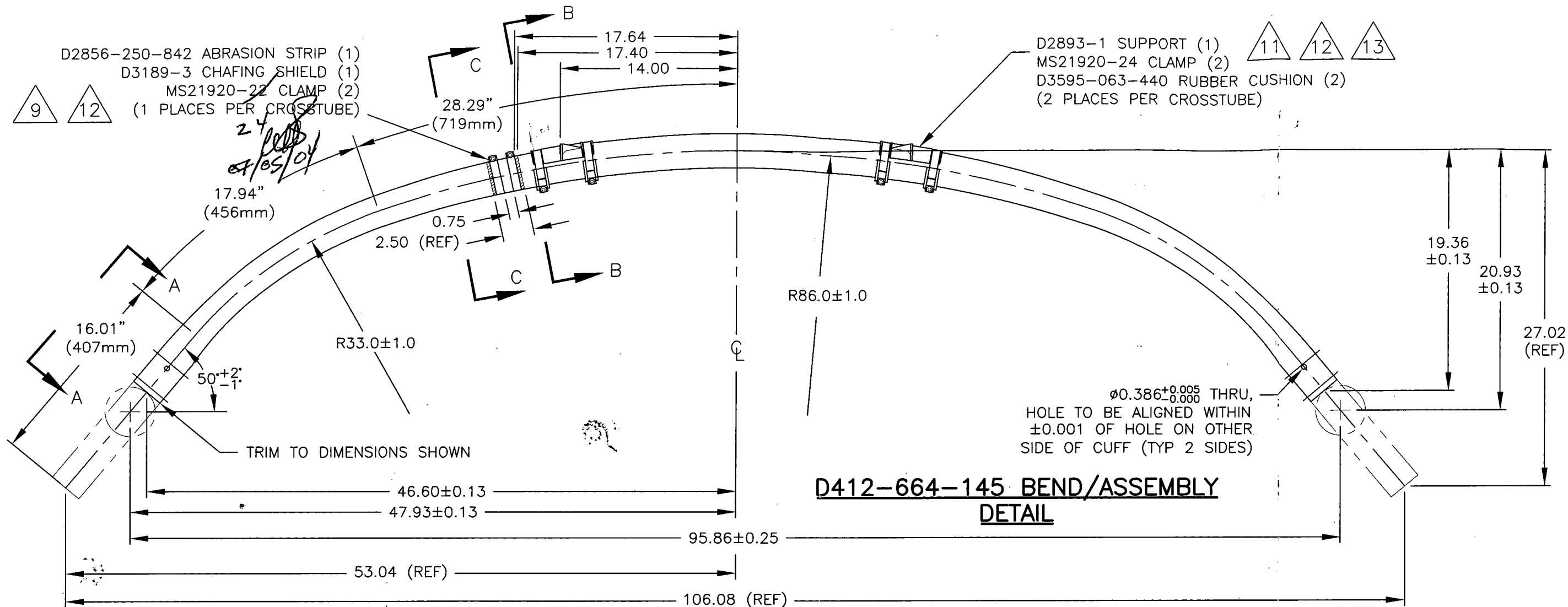
D412-664-145 MACHINING DETAIL

Total
Length
121.476

PRELIMINARY ISSUE

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NO. 31152

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THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.		CHECKED <i>#</i>	APPROVED <i>#</i>	DRAWING NO. D412-664-145	REV. B SHEET 3 OF 3
DATE 07.03.01		TITLE CROSSTUBE (412 LOW-NARROW FWD)			SCALE 1:4



PRELIMINARY ISSUE

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DESIGN qp	DRAWN BY qp	DART	DART AEROSPACE LTD. HAWKESBURY, ONTARIO, CANADA
CHECKED #	APPROVED #	DRAWING NO. D412-664-145	REV. B SHEET 2 OF 3
DATE 07.03.01	TITLE CROSSTUBE (412 LOW-NARROW FWD)	SCALE 1:8	

93.2